

Fort Buford and Leech Farm, Dak.; Moorhead and Saint Vincent, Minn.; South Canisteo, N. Y.; Garrettsville, Ohio.

THUNDER-STORMS.

Thunder-storms were noted in the greatest number of states and territories (13) on the 18th, 27th, 30th, and 31st; in nine on the 15th, 16th, and 19th; in eight on the 14th and 24th; in seven on the 17th and 28th; in five, or less, on the 1st, 5th, 8th to 13th, 20th to 23d, 25th, 26th, and 29th. On the 2d, 3d, 4th, 6th, and 7th no thunder-storms were reported.

Thunder-storms occurred on the greatest number of days (12) in Tennessee; in California on eleven; in Kansas on ten; in Ariz., Ark., Fla., Ind. T., La., Miss., N. C., S. C., and Tex. on five to nine, inclusive; in Ala., Col., Conn., Ga., Idaho, Ill., Ind., Iowa, Ky., Me., Md., Mass., Mich., Mo., Mont., Nebr., N. H., N. J., N. M., N. Y., Ohio, Oregon, Pa., Utah, Va., and Wis. on less than five; in Dak., D. C., Minn., Nev., R. I., Wash., W. Va., and Wyo. none were reported.

MISCELLANEOUS PHENOMENA.

PRAIRIE FIRES.

Poplar River, Mont.: large prairie fires were burning on the plains north of this place on the 4th and 21st.

Yankton, Dak.: large prairie fires were observed in the east and south on the 7th and 28th. Prairie fires, very destructive to farm property, occurred two miles west of this city on 28th.

Fort Sully, Dak.: prairie fires were burning south of station on the 18th, and all around the station on the 19th, 25th, and 27th. Prairie fires were also observed from the 28th to 31st.

Bismarck, Dak.: extensive prairie fires were raging south of this city, on the west side of the Missouri, on the 25th and 26th; on the latter date slight fires were observed to northward.

Fort Yates, Dak.: prairie fires were observed to the north and west of this place at 1.20 p. m., 26th.

Huron, Dak.: prairie fires, which were driven by the high wind on the 28th, were very destructive in this section; many barns, houses, and hay-stacks were destroyed.

Prairie fires were also reported as follows: Fort Reno, Ind. T., 27th; Fort Sill, Ind. T., 2d to 8th, 10th to 15th, 17th to 20th, 26th to 31st.

HALOS.

Solar halos were most frequently reported in New York and California, where they were noted on sixteen days. In Michigan they were reported on fourteen days; in Oregon on thirteen; in Massachusetts and Tennessee on eleven; and in Illinois and Ohio on ten days. None were reported in Arkansas, Indian Territory, Nevada, New Mexico, Rhode Island, West Virginia, and Wyoming. They were noted in the greatest number of states and territories, fourteen, on the 23d and 27th; in thirteen on the 14th, 15th, and 22d; in eleven on the 11th; and in ten on the 2d, 13th, 21st, 24th, and 30th. There were no days for which solar halos were not reported in one or more states or territories.

Lunar halos were most frequently reported in Michigan, where they were noted on thirteen dates. In South Carolina they were reported on eleven, and in Tennessee on ten dates. In Utah no lunar halos were reported. They were reported in the greatest number of states and territories, twenty-four, on the 10th and 14th; in twenty-one on the 11th; in seventeen on the 13th and 15th; in thirteen on the 7th, 8th, 12th, and 16th, and in ten on the 9th. On the 1st, 3d, 20th, 25th, 27th, 28th, and 29th no lunar halos were reported.

Leavenworth, Kans.—A lunar halo of 22° radius was observed forming at about 8.30 p. m., 13th. It was very distinct and perfectly formed, and the prismatic colors were clearly defined from 10 to 11 p. m. The halo lasted in perfect form for over four hours. As it began to disappear the colors first began to grow dim and indistinct; the diameters commenced to slowly contract, and the halo became smaller.

METEORS.

The distribution of meteors, by dates, was as follows: 1st, Hay Springs, Nebr. 4th, Riddleton, Tenn. 5th, Oregon, Mo. 6th, Fort Sully, Dak. 9th, Lead Hill, Ark.; Statesburgh, S. C. 20th, Riddleton, Tenn. 22d, Cedar Springs, S. C. 25th, Amherst, Leominster, and Newburyport, Mass.; Fremont, Mich. 26th Cedar Springs, S. C. 27th, Mesquite, Tex. 28th, Lead Hill, Ark.; Cleburne, Tex. 29th, Mantanzas, Fla.; Oregon,

Mo.; Wauseon, Ohio; Queensbury, N. Y. 30th, Wedgewood, N. Y. 31st, The Dalles, East Portland, and Portland, Oregon.

The following are descriptions of the more notable meteoric displays reported:

Newburyport, Mass.: a brilliant meteor was observed on the 25th, at 7.26 p. m. It fell from northwest of the zenith toward the northern horizon, and when about ten degrees above the horizon was seen to burst. The sound of the explosion was plainly heard about forty seconds later. It was brilliant enough to cast a plainly visible shadow.—*Report of F. V. Pike, voluntary observer.*

Portland, Oregon: at 9.08 p. m., 31st, local time, a brilliant meteor, about one-fourth the apparent size of the moon, was observed in the northeastern sky at an altitude of about 20°. It traveled in a northwesterly direction, passed through the dipper, and was last seen about 10° above the northwestern horizon, when it burst, leaving two clouds, seemingly of a light film of smoke, which gradually disappeared. Three minutes after a sound was heard, resembling the explosion of a rocket. A large number of shooting stars were seen immediately before and after its passage. The meteor was of an electric hue tinged with bluish purple toward the forward point, and the light was so intense that the shadow of trees and houses were clearly defined. From various sources it is learned that this meteor was observed for hundreds of miles around Portland. Its brilliancy and size were especially marked at all places.—*Report of Signal Service observer.*

The Dalles, Wasco Co., Oregon: a very large and brilliant meteor was observed at 9 p. m., 31st. It was first seen about 30° from the zenith, moving slowly in a direction about north 30° west. The stars were visible in the zenith, but clouds were more and more dense toward the horizon, and when the meteor entered the clouded part it grew redder as it descended, and like the sun at certain seasons, resembled a large red ball. The meteor remained visible until within 6° or 8° of the horizon, but possibly was only shut out from sight by passing behind the mountains. During its course a small part seemed to become separated from the rest but followed in a path parallel with the large body until lost to sight. The time of flight was about four or five seconds. It cast a plainly visible shadow until obscured by clouds.—*Report of Prof. D. Torbet.*

MIRAGE.

Mirage were reported as follows: Webster, Dak., 9th, 22d, 27th, 29th; Woonsocket, Dak., 10th; Hampton, Iowa, 5th. San Diego, Cal.: a mirage was observed in the southwest at 5 p. m., 25th; houses, trees, and other objects seemed to be setting on a vast lake, and a steamship appeared in an inverted position. The mirage was visible for nearly one hour.

SAND STORMS.

Keeler, Cal.: the high northwest wind which began 11.15 a. m., 20th, attained a maximum velocity of forty-five miles per hour at 11.45 a. m., raising blinding clouds of sand which made it almost impossible to venture out of doors without covering the face. A sand storm also occurred at this place on the 12th, and at San Carlos, Ariz., from the 1st to 4th.

POLLEN.

Sergeant F. H. Clarke, Signal Corps, Vicksburg, Miss., for-

warded to the Chief Signal Officer a small quantity of yellow dust which fell during a rain at that place on the 23d. A sample of the dust was sent to the Department of Agriculture, and the following letter referring thereto has been received:

U. S. DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., April 1, 1889.

Gen. A. W. GREELY, Chief Signal Officer:

DEAR SIR.—Your letter of the 29th ult., containing sample of yellow dust, said to have fallen at Vicksburg, Miss., with the rain of the 23d ult., has been duly received and referred to the botanist for investigation, who reports that the powder is pollen, of a species of pine, probably that of the southern pine, of which extensive forests occur in the Gulf region. Showers of this pollen frequently fall in this city and farther north, being wafted from the pine forests by heavy storms occurring when the pine trees are in blossom, and precipitated by the rain.

Very respectfully,

(Sig.) J. M. RUSK, Secretary.

The MONTHLY WEATHER REVIEW for March, 1879, gives reports of pollen noted during that month at South Bethlehem, Pa., New Orleans, La., and Lynchburg, Va.

SUN SPOTS.

Mr. John W. James, Riley, McHenry Co., Ill.: none seen until the 6th, then one, two days from east edge of disc, passing sun's meridian 10th and disappearing by the solar rotation 16th. Another broke out east of it 15th, disappearing on west edge 17th; none seen after. Mr. H. W. Govey, North Lewis-

burgh, Champaign Co., Ohio: sun spots were observed on the 8th, and from the 11th to the 16th, inclusive.

Haverford College Observatory, Pa. (observed by Mr. H. V. Gummere):

Date, March, 1889.	Number of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculae.	Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.		
1, 11 a. m.	0	0	0	0	0	0	1	12	1	Definition poor.
6, 11 a. m.	1	2	0	0	0	0	1	2	3	Definition good.
7, 11 a. m.	0	2	0	0	0	0	1	4	1	Definition good.
8, 10 a. m.	0	3	0	0	0	0	1	7	1	Definition very good.
9, 11 a. m.	1	1	0	0	0	0	1	7	1	Definition very poor.
11, 11 a. m.	0	0	0	0	0	0	2	6	1	Definition fair.
12, 11 a. m.	0	0	0	0	0	0	2	6	1	Definition fair.
13, 11 a. m.	1	1	0	0	1	2	17	0	0	Definition very good.
14, 11 a. m.	0	0	0	0	0	0	2	5	0	Definition very poor.
18, 4 p. m.	0	0	0	0	0	0	0	0	0	Definition poor.
22, 11 a. m.	0	0	0	0	0	0	0	0	0	Definition poor.
23, 11 a. m.	0	0	0	0	0	0	0	0	0	Definition good.
26, 11 a. m.	0	0	0	0	0	0	0	0	0	Definition poor.
27, 3 p. m.	0	0	0	0	0	0	0	0	3	Definition very good.
29, 11 a. m.	0	0	0	0	0	0	0	0	1	Definition fair.
30, 9 a. m.	0	0	0	0	0	0	0	0	0	Definition poor.

VERIFICATIONS.

INDICATIONS FOR 24 HOURS IN ADVANCE.

The percentages of verifications of the 8 p. m. daily indications for February, 1889, as determined from comparison of succeeding telegraphic reports, are given in the table below.

The predictions for districts east of the Rocky Mountains for February, 1889, were made by 1st Lieutenant Richard E. Thompson, 6th Infantry, Acting Signal Officer and Assistant, and those for the Pacific Coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Assistant Professor C. F. Marvin.

Percentages of indications verified, February, 1889.

States.		States.	
Maine	79.5	Tennessee	84.7
New Hampshire	80.7	Kentucky	83.4
Vermont	83.8	Ohio	79.4
Massachusetts	85.2	West Virginia	75.1
Rhode Island	84.6	Indiana	77.8
Connecticut	83.0	Illinois	80.4
Eastern New York	82.0	Lower Michigan	78.5
Western New York	76.5	Upper Michigan	76.9
Eastern Pennsylvania	80.6	Wisconsin	76.4
Western Pennsylvania	72.5	Minnesota	77.5
New Jersey	78.1	Iowa	77.0
Delaware	80.1	Kansas	79.0
Maryland	78.1	Nebraska	80.9
District of Columbia	78.0	Missouri	80.1
Virginia	78.2	Colorado	79.4
North Carolina	86.5	Dakota	79.9
South Carolina	86.6	Southern California*	87.4
Georgia	84.2	Northern California*	81.5
Eastern Florida	79.2	Oregon*	69.4
Western Florida	76.6	Washington Territory*	64.3
Alabama	79.5	By elements: Weather	81.4
Mississippi	80.7	Temperature	78.0
Louisiana	80.1	Monthly percentage of weather and temperature combined †	80.0
Texas	77.1		
Arkansas	85.7		

* In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. † The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

CAUTIONARY SIGNALS FOR FEBRUARY, 1889.

Statement showing percentages of justifications of wind signals and cold-wave signals for the month of February, 1889:

Wind signals.—(Ordered by 1st Lieutenant Richard E. Thompson.) Total number of signals ordered, fifty-six; justified as to velocity, wholly, thirty-three, partly, five; justified as to direction, forty-nine. Of the signals ordered, twenty

were cautionary, of which eight were wholly, and two partly justified; thirty-six were storm signals, of which twenty-five were wholly, and three partly justified. Number of signals ordered for easterly winds, twelve; justified, nine. Number of signals ordered for westerly winds, forty-four; justified, forty. Number of signals ordered late, three. Number of winds without signals, twenty-eight. Percentage of justifications, 57.7.

Cold-wave signals.—(Ordered by Assistant Prof. T. Russell.) Total number of signals ordered, three hundred and fifty-one, of which two hundred and twenty-six were wholly, and eight partly justified. Thirty-four signals were ordered late. Number of severe cold-waves without signals, twenty. Percentage of justifications, 61.9.

The predictions for districts east of the Rocky Mountains for March, 1889, were made by Assistant Professor H. A. Hazen, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Assistant Professor C. F. Marvin.

Percentages of indications verified, March, 1889.

States.		States.	
Maine	79.5	Tennessee	81.2
New Hampshire	78.1	Kentucky	80.4
Vermont	79.6	Ohio	73.4
Massachusetts	81.7	West Virginia	71.4
Rhode Island	83.7	Indiana	75.2
Connecticut	85.6	Illinois	75.2
Eastern New York	77.7	Lower Michigan	72.5
Western New York	74.6	Upper Michigan	70.7
Eastern Pennsylvania	82.1	Wisconsin	80.3
Western Pennsylvania	72.8	Minnesota	77.5
New Jersey	83.2	Iowa	83.5
Delaware	81.1	Kansas	77.5
Maryland	80.3	Nebraska	83.5
District of Columbia	83.4	Missouri	78.8
Virginia	80.6	Colorado	78.1
North Carolina	83.4	Dakota	81.9
South Carolina	86.0	Southern California*	86.4
Georgia	86.3	Northern California*	89.0
Eastern Florida	87.5	Oregon*	80.6
Western Florida	90.8	Washington Territory*	85.4
Alabama	88.0	By elements: Weather	86.5
Mississippi	84.1	Temperature	70.7
Louisiana	84.1	Monthly percentage of weather and temperature combined †	80.2
Texas	71.7		
Arkansas	79.2		

* In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. † The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.